Cost
Estimating

FOREWORD

This Guide provides procedures and instructions to accomplish the required cost estimates for U.S. Army Corps of Engineers, Sacramento District Military Projects. This Guide will be referenced in all Architect-Engineer (A-E) contracts when applicable. In the event of conflict between this Guide and the contract document, the contract document shall take precedence, and the A-E shall document the conflict in writing and bring it to the immediate attention of the Corps of Engineers' Project Manager (PM).

A-E GUIDE - VOLUME 2
Cost Estimating (CACES)

PURPOSE:

To present guidance for the preparation of military construction cost estimates.

TYPES OF ESTIMATES:

Design Estimates

Code A	Budget Estimates
Code B	Concept & Preliminary Estimates
Code C	Final Estimates

Value Engineering Forms

VEAF	Value Engineering Alert Form
ACM	Abbreviated Cost Model
GFA	Graphical Functional Analysis

METHOD OF PREPARATION

The Architect-Engineer (A-E) shall prepare cost estimates using:

1. Manual Format (Code A estimates only)
2. Computer Format
   - Computer Aided Cost Estimating System (CACES).

SUBMITTAL REQUIREMENTS

The A-E will submit the cost estimate concurrently with each design submittal,

but under a separate cover. The A-E's scope of work defines the specific submittals required. The A-E shall provide a back check cost estimate for resolution of, and compliance with, estimating comments when requested.

SECTION

SECTION I

MANUAL CODE A

CODE A PREPARED ESTIMATE

The Code A estimate is a general (order-of-magnitude) estimate based on limited project information. The estimate consists of unit costs applied to the major items and quantities of work. The estimate shall separate the project's Building Cost from the Site and Utilities cost. A separate System Summary Sheet is required for each Building. If the Site and Utilities are non-continuous, one System Summary Sheet for each totally separate area is required.

The unit cost shall reflect the complete direct current cost of work - complete cost being labor, material, waste allowance, subcontractor's markups, sales tax, etc. After unit costs have been totaled, the prime contractor's markups and escalation shall be applied. On the summary sheet, Building Cost and Site and Utilities are totaled to obtain a Total Base Contract Cost. To complete the estimate, Contingencies During Construction, Supervision & Administration, and Sub-Allotment costs are added.

COST ESTIMATORS

The A-E shall prepare, or have prepared by estimating consultants, a professional quality cost estimate. Estimates shall be prepared and reviewed by personnel who are competent in construction cost estimating. The cost estimator must possess a working knowledge of construction, be able to make professional determinations based on experience, and be capable of applying sound judgement on construction methodology. The A-E shall obtain assistance from firms specializing in cost estimating if it's own firm is not adequately staffed to prepare the required cost estimate.

MANUAL FORMAT FOR CODE A

The A-E shall prepare a Code A estimate when required by his scope of work. The Code A estimate shall be organized as outlined using the cost estimating sheets shown in this section of the guide. The A-E may elect to prepare the estimate using an electronic spreadsheet, however, the original estimating sheets must be duplicated. The deliverable items required are as follows:

A. ESTIMATE COVER SIGN-OFF SHEET

B. SUMMARY SHEET

C. ESTIMATE

The estimate consists of System Summaries and Unit Cost Estimate Sheets.

D. BACKUP DATA

1. Building Floor Layout (To scale)

2. Site Plan (To scale)

OUTLlNE SCENARIO: WORK TASKS

A. Prepare Building Layout & Site Plan

B. Prepare Unit Cost Estimate

C. Prepare System Summary Sheets

D. Prepare Summary Sheet

E. Prepare Estimate Cover Sign-Off Sheet

F. Submit Deliverable Items as Required

G. Correct Estimate per Review Comments

H. Submit Back Check Estimate

ORGANIZATION OF CODE A ESTIMATE

Code A estimates shall be organized as follows:

A. An estimate Cover Sign-Off Sheet shall be submitted, followed by a Summary Sheet. Subtotals from each System Summary Sheet are forwarded to the Summary Sheet.

B. A System Summary Sheet, Building Cost shall be provided for each building.

C. A System Summary Sheet, Site and Utilities shall be provided.

D. Unit Cost Estimate sheets shall be provided to support the System Summary Sheets.

E. A Building Floor layout plan shall be provided for each building.

F. A Site & Utility plan shall be provided showing proposed outside works.

ESTIMATING SHEETS

CODE A ESTIMATES

ESTIMATE COVER SIGN-OFF SHEET

The purpose of this sheet is to:

A. Provide Cover

Provide a common cover sheet for all Military Cost Estimate submittals to U.S. Army Corps of Engineers, Sacramento District.

B. Identify Project

Identify project by Project Title, Project Location (Installation Name and State), Specification Number, and Project Number.

C. Sign-Off

Identifies the Architect-Engineer Firm, provides for sign-off by the responsible A-E representative, and provides their respective phone numbers.

SUMMARY SHEET

The purpose of this sheet is to:

A. Summarize Costs

The Building Cost(s), Site & Utilities Cost, Sub-Allotment Cost, and Additive Cost(s) are summarized to this sheet from all cost distribution sheets. Separate buildings shall be listed and the cost of each building shall be shown on the Summary Sheet. The Total Building Cost shall also be shown.

B. Develop Current Working Estimate

The CWE is developed by including Contingencies During Construction, and Supervision & Administration costs. The Contingencies During Construction shall be 5% for new work or 10% for alteration work. Supervision & Administration shall be 5.5% except Operation and Maintenance (O & M) projects which are normally 7.5%; check with Corps of Engineer's Project Manager.

C. Show Funding Information

The Programmed Amount (PA), 90% Programmed Amount, and Midpoint of Construction are stated. The A-E may obtain PA information from the Corps of Engineers' Project Manager.

All costs shall be rounded to the nearest hundred dollars.

U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS

SUMMARY SHEET

SPEC NO:
DATE:
EST BY:
CODE:

BUILDING COST . . . . . $

Total Buildings . . . . . $

SITE & UTILITIES . . . . . .

Total Contract Cost . . . . . $

Contingencies During Construction . .(%) . . . . . .

Subtotal . . . . . $

Supervision & Administration . . .(%) . . . . . .

Total Construction . . . . . $

SUB ALLOTMENT . . . . . .

Total CWE Without Additives . . . . . $

ADDITIVE ITEMS
A1 . . . . . .
A2 . . . . . .
A3 . . . . . .

Total Additive Contract Cost . . . . . $

Contingencies During Construction . .(%) . . . . . .

Subtotal . . . . . $

Supervision & Administration. . . .(%) . . . . . .

Total Additives CWE . . . . . $

Total CWE Including All Additives . . . . . $

Programmed Amount . . . . . $
  90% Programmed Amount . . . . . $

Based on Midpoint of Construction During _____ Month, Calendar Year, 19 ____.

SYSTEM SUMMARY SHEET, BUILDING COST

The purpose of this sheet is to:

A. Categorize Costs

Building costs shall be categorized to the System Summary format.

B. Estimate Quantities and Unit Costs

Unit square foot measurement most applicable to the System should be selected in place of lump sum pricing whenever possible. For example, the total exterior wall square footage and an overall current applicable unit cost should be estimated.

C. Summarize Costs

Direct costs shall be summarized.

D. Apply Markups and Escalation

Markups shall be applied to the current direct cost; escalations shall then be applied to establish the Midpoint Building cost.

Rounding:

a. Estimated Quantity to three significant figures.
b. Unit Cost to three significant figures or nearest 5 cents.
c. Total Cost to nearest dollar.
d. "Building Cost (rounded)" to nearest hundred dollars.

SYSTEM SUMMARY SHEET, SITE AND UTILITIES

The purpose of this sheet is to:

A. Categorize Costs

Site and Utilities Cost shall be categorized to major Account Descriptions.

B. Estimate Quantities and Unit Cost

Unit measurements should be selected and the associated unit cost be in place of lump sum pricing whenever possible. Current and complete unit costs shall be shown.

C. Summarize Costs

Direct costs shall be summarized.

D. Apply Markups and Escalation

Markups shall be applied to the current direct cost; escalations shall then be applied to establish the Midpoint Site and Utilities cost.

Rounding:

a. Estimated Quantity to three significant figures.
b. Unit Cost to three significant figures or nearest 5 cents.
c. Total Cost to nearest dollar.
d. "Site and Utilities (rounded)" to the nearest hundred dollars.

UNIT COST ESTIMATE

The purpose of this sheet is to:

A. List Work

List work items in sufficient detail to ensure a complete and adequate estimate.

B. Provide Estimated Quantities

Listed work items shall be assigned known or assumed quantities with stated units. Waste allowances and contingencies shall not be included, but applied within the unit prices or shown separately.

C. Estimated Unit Cost

Unit costs shall be used in place of lump sum pricing whenever possible. Unit costs shall reflect current direct prime contractor's cost. which includes:

1. All working trade labor, wages, fringes, taxes, insurance and pertinent costs.

2. Plant and Equipment chargeable directly against work.

3. Materials and Supplies, waste, losses, storage, discountsor vendor's markups and sales tax.

4. Subcontractor's cost shall be "cost to prime", therefore including subcontractor's markup, or maybe subcontractor's direct cost with markup shown separately.

D. Summarize Work

Direct costs shall be subtotaled sufficiently to permit prior analysis and allow the reviewer to track figures to preceding summary sheets.

Rounding:

a. Estimated Quantities to three significant figures.
b. Unit Cost as appropriate to the item and estimate.
c. Total Cost to the nearest dollar.

SECTION II

COMPUTER CODE B & C

COMPUTER AIDED COST ESTIMATING SYSTEM (CACES)

CACES produces military cost estimates utilizing detailed data supplied by users. The CACES programs reside on The Middle East Division's (MED) Honeywell DPSB computer near Winchester, Virginia.

The Architect-Engineer user accesses the system through Remote Job Entry (RJE). Communication connection is made through voice-grade telephone lines where the user transmits individual project data. Project data is processed using pricing data from the applicable Unit Price Book (UPB) files. When an estimate has completed processing, the user can reconnect and receive a printed cost estimate.

The purpose of CACES is to provide a complete task and cost breakdown for a project. The level of task breakdown required shall be as reflected in the UPB, using the UPB whenever possible. The cost breakdown provides for labor, equipment and material pricing. Inputting of grouped tasks, unit pricing, or quotes that fail to provide the cost breakdown of contractors' and subcontractors' work is not acceptable. Procedures exist to adjust extracted UPB pricing data for an individual project. The UPB is not site specific; therefore, the user is required to make all necessary adjustments for each project.

A "Computer Aided Cost Estimating System (CACES)" user's manual (EP 415-345-6), dated September 1987, is available for Architect-Engineers through the U.S. Corps of Engineers, Sacramento District.

CODE B ESTIMATE

The Code B estimate is an early concept or preliminary estimate. A detailed breakdown of the work shall be listed and described whenever possible. Quantities shall be based to the maximum extent possible on take-off; remaining quantities shall be based on assumptions intended to assure an adequate overall estimate. For the Code B estimate only, Design Contingencies shall be added using the other factor columns on the current working estimate (CWE) data line. This is necessary to reflect the incompleteness of design. Use 5 percent for new facility construction and 10 percent for remodel of existing facilities.

Partial backup data shall be furnished; it shall consist of overhead breakdown, quantity take-off, labor rates and quote information. The quote information will be obtained from local suppliers, subcontractors's or other sources that may reasonably be expected to engage in the construction of the project. Reference books, estimating manuals, Unit Price Book, and other general reference guides are not acceptable sources for a quote.

CODE C ESTIMATE

The Code C estimate is a final estimate. A detailed breakdown of the work shall be listed that reflects the drawings and specifications. Quantities shall be based on take-offs. Design contingencies shall not be added on the Code C estimate since this is a complete design based estimate.

Complete backup data shall be furnished. It shall consist of overhead breakdown, quantity take-off, labor rate, and quote information.

COST ESTIMATORS

The A-E shall prepare, or have prepared by estimating consultants, a professional quality cost estimate. Estimates shall be prepared and reviewed by personnel who are competent in construction cost estimating. The cost estimator must possess a working knowledge of construction, be able to make professional determinations based on experience, and be capable of applying sound judgement on construction methodology. The A-E shall obtain assistance from firms specializing in cost estimating if it's own firm is not adequately staffed to prepare the required cost estimate.

COMPUTER FORMAT FOR CODE B & C

The A-E shall prepare a Code B and/or Code C estimate using CACES. The estimate shall be organized as shown in this section of the guide and Appendix C. The deliverable items are as follows:

A. ESTIMATE COVER SIGN-OFF SHEET

B. SUMMARY SHEET

C. COMPUTER PRINTED ESTIMATE
(Reduce and submit on 8-1/2 X 11 inch paper.)

D. BACKUP DATA

1. Overhead and Distributive Cost Breakdown

2. Take-Off Worksheets

3. Supporting Quotes & Information

4. Value Engineering Forms (when applicable)

E. CREATE ESTIMATE PROGRAM DATA FILE
(5-1/4" IBM-compatible MS-DOS floppy disk)

F. RETURN UNIT PRICE BOOK (UPB)
(Book to be returned after completion of A-E contract)

NOTE

Every A-E submitted estimate shall include the above items A through E.

OUTLINE SCENARIO: WORK TASKS

A. Obtain Government furnished items.

B. Perform Quantity Survey.

C. Obtain Supporting Quotes and Information.

D. Encode Quantities and Job Data.

E. Prepare Create Estimate Program Data.

F. Perform A-E Equipment Test.

G. Execute CACES Program.

H. Review and Correct Create Estimate Program Data.

l. Rerun CACES Program.

J. Submit Deliverable Items as Required.

K. Correct Estimate Per Review Comments.

L. Submit Back Check Estimate.

M. Return Unit Price Book.

ORGANIZATION OF CODE B AND C ESTIMATES

Computer Code B and C estimates shall be organized as follows:

A. An Estimate Cover Sign-Off Sheet shall be submitted, followed by a Summary Sheet. Computer estimate summary results (costs of Buildings, Site and Utilities. and Additives) shall be carried forward to the Summary Sheet.

B. An input listing of the CACES file shall be submitted. This listing is received with each output run.

C. An index of the CACES run shall precede the estimate. This index is found at the end of each run, and shall be moved forward of the estimate when submitted.

D. Summaries and detailed estimate shall be submitted. Individual buildings shall be separated. Site and Utility costs shall be separate from the Building cost. If additives are included, their costs shall be separately shown.

E. CACES error reports are received with each run; place these reports after the cost estimate. The reports indicate errors or state that no errors were found. The A-E shall prepare an error-free CACES cost estimate showing compliance with the submission of the error reports.

F. Backup data for the estimate shall be provided, and shall include information such as price quotes, labor rate calculations, and material take-off worksheets. Also, include Value Engineering (V-E) forms when required by your scope of work.

Computer output (input listing, index, estimate, and error report) must be reduced to 8-1/2 x 11 inch paper when submitted. Other portions of the computer output shall not be submitted.

G. One Create Estimate Data File shall be provided with the estimate submitted for review by Cost Estimating Section. The A-E shall provide a 5-l/4" IBM-compatible MS-DOS floppy disk with this input data. The A-E shall not submit the detailed estimate on the floppy disk.

GOVERNMENT FURNISHED ITEMS

The Government will furnish the A-E with the following items:

A. INFORMATION AND SPECIAL INSTRUCTIONS

B. CHECK STATUS, PRINT ESTIMATE, AND FINAL STORAGE DECK PROCEDURES

C. TEST FILE ON FLOPPY DISK (upon request)

D. ENCODING FORMS (upon request)

E. CACES USERS MANUAL (upon request)

F. UNIT PRICE BOOK (UPB) - to be returned

EQUIPMENT REQUIRED BY THE A-E

The A-E is responsible for its own access equipment and the ability to send and receive data. The A-E needs the following equipment for Remote Job Entry (RJE) to the CACES program:

A. TOUCH-TONE TELEPHONE LINE

B. 4800 BAUD MODEM & DATA SET
(BELL-COMPATIBLE)

C. DATA READING/PRINTING DEVICE
(EMULATING RC 115, OR 3780, OR 2780) .

REMOTE JOB ENTRY

The RJE terminal must be capable of dial-up operation at 4800 BPS (Bell 208B Modem) and supporting on the following Protocols:

RC 116-ASCII
lBM 3780 Bisynchronous - EBCDIC
IBM 2780 Bisynchronous - EBCDlC

INFORMATION

The following information shall be supplied to the A-E at contract award and as required by changes in IDs and PASSWORDS:

A. GRTS ID: ----------

B. GRTS PASSWORD:----------

C. SNUMB NO: (See Note)----------

D. ACCOUNT INFORMATION:----------

E. USERID:----------

F. PASSWORD:----------

G. UPB TAPE GENERATION NO:----------

H. UPB TAPE NAME:----------

I. COMPUTER CENTER
TELEPHONE NOS:----------

SPECIAL INSTRUCTIONS

The A-E shall run the estimate against the current UNIT PRICE BOOK. The UPB TAPE NAME and UNIT PRICE BOOK will be provided as they are updated.

The A-E will be allowed a maximum of six free runs per Code B estimate and a maximum of six free runs per Code C estimate. Each input of the Create Estimate Deck by the A-E to the Winchester computer shall be counted as a run except for the computer test deck testing of equipment. Additional runs on either the Code B or Code C estimate shall be charged to the A-E at $150.00 per run.

NOTE

The last 2-digits will be numeric beginning with 01 and will increase by 1 on subsequent runs.

COMPUTER TEST FILES FOR A-E EQUIPMENT

The A-E will be supplied with a test file on a floppy disk (upon request) for testing equipment compatibility with the Government's Winchester computer.

A. Create Estimate

This test file (listing shown) will test the A-E's equipment's capability to create a CACES estimate. Load Create Estimate test file using dial-up operation with 4800 baud equipment via the GRTS Emulator. After transmission of the test file, the A-E should terminate dial-up connection to allow for processing time at Winchester. The Multipunch and Blank data lines may or may not be required. They are used when processing on unique equipment.

B. Check Status

The Check Status test file (listing shown) will check the status of the "Create Estimate" activity. Load Check Status test file (allow for processing time) again using dial-up operation to check processing status on your job.

C. Print Estimate

The Print Estimate test file (listing shown) will print back the estimate to the A-E's equipment. Load this file after checking status.

Create Estimate LOAD THE FOLLOWING DATA TO CREATE A ESTIMATE:

```
$*$U6 DOMTMR
$*$RCD
$      SNUMB   SPK00
$      IDENT   407723TESTAE,OPERATIONTEST,2108SOASPS
$      USERID  2108SOASPS$SXANMT
$      PARAM   GEN01,ESSPK7UPB87A
$      SELECT  2108HUD170/CACES/XQT/76120.AX
$      DATA    CR
PJ    A-E EQUIPMENT TEST * CACES  U.S.ARMY ENGR.DIST.SAC.     C95% REVIEW
AE    COST ESTIMATING           SPKED               01/31/84
Y
RF                            6
N1 SPECIFICATION NO. 1234X
N2 THIS TEST ESTIMATE IS FOR CHECKING A-E EQUIPMENT COMPATIBILITY WITH
"CACES".
PMU GENERAL/PRIME           CB        12P
C0.080.060.100.110.060.110.07
SCSW    SITEWORK                10 P          8 P
SCEL    ELECTRICAL               8 P          7 P
BI001 ADMINISTRATION BUILDING
FC BUILDING COMPLETE                                        1EA        1
402022253102 EXC BULK          CY     25
402022253102 HAUL AND WASTE              R
302025121002 SITE DRAINAGE         SF   4500 CODEK4500    0.37
302025121002 12 IN GRAVEL BLANKET           R
BI002 SITE WORK
FC SITE WORK                                                1EA        1
401150621205 6 IN SANIT. TEE SWEA      1
415022262303 EXCAVATION        CY   3744
401161402101 120V 20AMP REC  ELEA     24
416150621001 2 IN CISP       SWLF    110
416150621001                                P  50
$      SELECT  2108HUD170/CACES/XQT/76125.AX
$      DATA    CR
EST       US   NN NN NNNNN NN NN             SACRAMENTO DISTRICT, CALIFORNIA
$      ENDJOB
7,8 MULTIPUNCH (Optional Control Card)
    BLANK (Optional Control Card)
    BLANK (Optional Control Card)
```

Check Status LOAD THE FOLLOWING DATA TO CHECK STATUS OF ESTIMATE:

```
$*$U6 DOMTMR
$*$STSSPK00
7,8 MULTIPUNCH (Optional Control Card)
    BLANK (Optional Control Card)
    BLANK (Optional Control Card)
```

Print Estimate LOAD THE FOLLOWING DATA TO PRINT THE ESTIMATE:

```
$*$U6 DOMTMR
$*$OUTSPK00
7,8 MULTIPUNCH (Optional Control Card)
    BLANK (Optional Control Card)
```

BLANK (Optional Control Card)

ESTIMATING SHEETS

COMPUTER CODE B & C ESTIMATES

ESTIMATE COVER SIGN-OFF SHEET

The purpose of this sheet is to:

A. Provide Cover

Provide a common cover sheet for all Military Cost Estimate submittals to U.S. Army Corps of Engineers, Sacramento District.

B. Identify Project

Identify project by Project Title, Project Location (Installation Name and State), Specification Number, and Project Number.

C. Sign-Off

Identifies the Architect-Engineer Firm, provides for sign-off by the responsible A-E representative, and provides their respective phone number.

SUMMARY SHEET

The purpose of this sheet is to:

A. Summarize Costs

The Building Cost(s), Site & Utilities Cost, Sub-Allotment Cost, and Additive Cost(s) are summarized to this sheet from all cost distribution sheets. Separate buildings shall be listed and the cost of each building shall be shown on the Summary Sheet. The Total Building Cost shall also be shown.

B. Develop Current Working Estimate

The CWE is developed by including Contingencies During Construction, and Supervision & Administration costs. The Contingencies during Construction shall be 5% for new work or 10% for alteration work. Supervision and Administration shall be 5.5% except Operation and Maintenance (O & M) projects which are normally 7.5%; check with Corps of Engineers' Project Manager.

C. Show Funding Information

The Programmed Amount (PA), the 90% Programmed Amount, and the Midpoint of Construction are stated. The A-E may obtain PA information from the Corps of Engineers' Project Manager.

All costs shall be rounded to the nearest hundred dollars.

U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS

SUMMARY SHEET

SPEC NO:
DATE:
EST BY:
CODE:

BUILDING COST . . . . . $

Total Buildings . . . . . $

SITE & UTILITIES . . . . . .

Total Contract Cost . . . . . $

Contingencies During Construction . .(%) . . . . . .

Subtotal . . . . . $

Supervision & Administration . . .(%) . . . . . .

Total Construction . . . . . $

SUB ALLOTMENT . . . . . .

Total CWE Without Additives . . . . . $

ADDITIVE ITEMS
A1 . . . . . .
A2 . . . . . .
A3 . . . . . .

Total Additive Contract Cost . . . . . $

Contingencies During Construction . .(%) . . . . . .

Subtotal . . . . . $

Supervision & Administration. . . .(%) . . . . . .

Total Additives CWE . . . . . $

Total CWE Including All Additives . . . . . $

Programmed Amount . . . . . $
  90% Programmed Amount . . . . . $

Based on Midpoint of Construction During _____ Month, Calendar Year, 19 _____.

CREATE ESTIMATE PROGRAM DATA

The A-E user accesses the system through dial-up telephone lines. Create Estimate Program Data, which contains the user's project data, is transmitted. After transmission the A-E should terminate dial-up connection to allow for processing time on the Winchester computer.

At some later time, the A-E user would again access the system using the dial-up procedure. The A-E should check the status of the previously transmitted project using a Check Status data file. If the computer has completed processing, the user should use a Print Estimate data file to recover (print) his estimate.

The following pages outline the Create Estimate Data in detail.

CREATE ESTIMATE DATA

The Create Estimate data is a file on the user's personal computer and is shown as decks of cards for illustration purposes only.

The Create Estimate Data is shown configured into four ordered parts for user orientation. The input data stream is continuous; each user must input this data to the Winchester computer to receive a CACES cost estimate.

Job control data, referred to as Job Control Language (JCL) statements, constitute the user's batch-mode interface with the Winchester computer system.

Project information data follow the job control data. The project information data provide information such as project name, A-E's name, scope of work, and fundamental estimating data.

Quantity information data constitute the major volume of user input. The project's specific estimating data for various construction tasks is organized, coded, identified, and quantified. The A-E will be required to provide a detailed breakdown for all construction tasks. The level of detail required shall be as reflected in the UPB. The acceptable organization is shown in Appendix C.

Processing Data are required at the end to complete the Create Estimate Data file. Encoded instructions allow the user the option of printing or suppressing certain output estimate reports.

JOB CONTROL DATA

Eight job control data lines are required at the beginning of the Create Estimate Data File. Job control data are depicted showing the required contents in each column where common for all jobs. The shaded columns are left uncoded (blank). The user shall encode the remaining columns from information supplied to the A-E upon contract award.

LINE 1
GRTS ID: ----------(Column 4-5)
GRTS PASSWORD: ----------(Column 7-12)

LINE 2
Information as illustrated

LINE 3
SNUMB NO: ----------(Column 16-20)

LINE 4
USERID: ----------(Column 16-25)
ACCOUNT INFORMATION: ----------(Column 35-42)

LINE 5
USERID: ----------(Column 16-25)
PASSWORD: ----------(Column 27-33)

LINE 6
UPB TAPE GENERATION NO: ----------(Column 19-20)
UPB TAPE NAME: ----------(Column 22-33)

LINE 7
Information as illustrated

LINE 8
Information as illustrated

PROJECT INFORMATION DATA

Of the ten different types of Project Information lines available for data entry, three are mandatory for CACES processing. The required lines are the PJ Project, AE Arch-Engr, and at least one N(1) Project Note. The remaining data lines are, in most cases, necessary to obtain a complete estimate. The mandatory order of the Project Information is as shown. The user shall prepare a complete set of Project Information data, encoding information to the maximum extent possible. Project Notes shall describe the scope and type of project. Labor rates shall be encoded based on a survey of local prevailing wages. Reasonable subcontractor mark-ups shall be applied to all subcontracted work.

QUANTITY INFORMATION DATA

Quantity Information data are: Bid Item, Facility, Facility Note, Code 3 and Code 4. For CACES processing, there must be at least one Bid Item, followed by a Facility, followed by either one Code 3 or Code 4 entry.

Bid Items are used to establish the major cost groups within the project estimate. Subgroupings are formed by facilities. Code 3 and Code 4 entries are grouped behind each appropriate Facility to input specific quantity data. The purpose is to separate "Building Costs" from "Site and Utilities" using Bid Items. Separate Bid Items are also used to distinguish between multiple buildings. Facilities can then be used to organize the Code 3 and Code 4 input data within a building and site work into Trade Summary Accounts (see appendix C). The number of Bid Item groupings and the number of Facility subgroupings behind each Bid Item shall correspond to the specific project being estimated. Code 3 and Code 4 entries must be nested behind the appropriate Facility.

Code 3 entries are used to quantify and price items not found within the Unit Price Book (UPB). Code 4 entries are used to quantify items within the UPB. The A-E shall use Code 4 entries whenever possible, but also include Code 3 entries as necessary. Include a brief description on all Code 4 entries and a full description on all Code 3 entries. Quantities shall be shown to three significant figures. Waste allowance shall not be included. Appropriate adjustments to standard UPB production rates and material costs shall be made. Appropriate subcontractor codes shall be encoded to all Code 3 and Code 4 entries representing subcontract work. The separation of costs shall reflect current construction procedures.

The acceptable organization is shown in Appendix C.
The level of detail required shall be as reflected in the UPB.

PROCESSING DATA

The Processing Data is required at the end of the Create Estimate File. The data depicted showing the required contents in each column where common for all jobs. The shaded columns illustrated are left uncoded (blank). The user shall encode columns 11-80 on the "EST" entry. Codes suppress various printed output estimate reports. Instructions for encoding are found with the Print Estimate report form. The Multipunch and Blank entries may or may not be required. They are used when processing on unique equipment.

ERROR REPORT

The A-E can check for errors without running a complete estimate. To check for errors, leave entries l, 2, and 3 out; encode only entries 4, 5, 6, and 7.

ESTIMATING SHEETS

BACKUP DATA FOR

COMPUTER METHOD, CODE B & C ESTIMATES

GENERAL REQUIREMENTS AND OVERHEAD

The purpose of this sheet is to:

A. Determine General Requirements

Estimate the type and extent of general requirement expenses for the particular project. General requirement expenses shall be divided into three major categories: distributives, personnel, and facilities.

B. Determine Home Office Expenses

Although each contractor operates differently, the estimated expenses shown should reflect a competitive bidding contractor's operation that is likely to bid the particular project.

C. Total Overhead

Total project Prime Contractor's Overhead consists of field plus home office costs. The total field plus home office cost shall be distributed and proportioned against the projects direct cost. This is accomplished by encoding a percentage or a dollar amount on the Prime Contractor's Markup (PMU) data line.

CONSTRUCTION COST ESTIMATE WORKSHEET

The purpose of this sheet is to:

A. Provide Backup Data

All Code B or C estimates require some backup data. These sheets can be used to show take-off and other backup information. Major money items shall be supported by take-off worksheets. Information should serve to inform the reviewer, and support the items, quantities, and prices found on the Construction Cost Estimate sheets. Reviewer may require that further backup be provided when necessary.

QUOTATION RECORD

The purpose of this sheet is to:

A. Record Quotation Information

Backup quotation records shall be submitted on:

1. Major Mechanical and Electrical Equipment

Transformers, Switch Gear, Refrigeration Equipment, Air Handling Devices, Boilers, Pumps, etc.

2. Special System and Items

Energy Monitoring Control Systems (EMCS), Fire Suppression System, Cranes, Elevators, Special Doors, Tempest Rooms, Computer Floors, etc.

3. Major Materials Used in Construction

Ready-Mix Concrete, Sand, Aggregate, Gravel, Asphaltic Concrete, Masonry Block, Roofing Materials, Large Pipe, etc.

4. Special Construction

Pre-engineered Buildings, Material Handling Systems, Storage Tanks, etc.

B. Record Quotation Background

Quotations may be obtained by written or telephone method. Background information shall include, at least, the company's name, phone number with area code, and person contacted.

The quote information shall be obtained from local suppliers, subcontractors or other sources that may reasonably be expected to engage in the construction of the project. Reference books, estimating manuals, Unit Price Book, and other general reference guides are not acceptable sources for a quote.

SECTION III

VALUE ENGINEERING (VE)

VALUE ENGINEERING (VE)

Value Engineering (VE) is a systematic approach in order to obtain optimum value for every dollar spent. The VE approach is a creative effort directed toward the analysis of function. This creative effort is based on development of alternative solutions for specific function. This is in contrast to simply cutting cost by using cheaper material or reducing quantities. Value Engineering analyze function by asking questions such as:

What is it?

What does it do?

What must it do?

What does it cost?

What other materials or method would do?

What would these other materials or methods cost?

Value Engineering analysis for a specific project begins by categorizing and displaying costs. Various forms are used to categorize and display costs depending upon the Current Working Estimate (CWE) of the project. The Value Engineering approach used the following forms:

A. Value Engineering Alert Form (VEAF)

B. Abbreviated Cost Model (ACM)

C. Graphical Function Analysis (GFA)

VALUE ENGINEERING FORMAT

The A-E, when required by his scope of work, shall categorize and display the project cost. The deliverable items shall be included as backup data with the estimate. The items are as follows:

A. All projects with CWE between $500,000 and $2,000,000 shall be categorized and displayed on the Value Engineering Alert Form (VEAF).

B. All projects with CWE in excess of $2,000,000 shall be categorized and displayed on the Abbreviated Cost Model (ACM) and shall include Graphical Functional Analysis (GFA) for the three highest cost Functions.

OUTLINE SCENARIO: WORK TASKS

A. Prepare Detailed Estimate
(per other applicable Section in this Guide)

B. Determine if the VEAF or the ACM and GFA are to be prepared.

C. Prepare the appropriate VE forms.

D. Submit Deliverable items as required.

E. Correct VE Forms per Review Comments.

F. Submit Back Check VE Forms.

VALUE ENGINEERING (VE) FORMS

VALUE ENGINEERING ALERT FORM (VEAF)

The purpose of this sheet is to:

A. Identify Entire Facility

List total CWE cost, quantity and unit. Develop a cost/unit relationship using the most reflective quantity and unit for the entire facility.

B. Identify High Cost Items

High cost items in the estimate shall be listed in descending order of cost.

C. Indicate Cost for Items

The cost associated with each item shall be the total CWE cost of that item. All markups in the estimate shall be included when developing the item's associated cost.

D. List Quantities and Units

The quantity and units most reflective of the items function shall be used.

E. Calculate Unit Cost

Divide the items cost by the items quantity.

F. Display High Cost Items on Bar Chart

Draw a bar chart for each of the above High Cost Items using the associated CWE cost of each item.

Rounding:

a. Costs shall be to the nearest dollar.
b. Quantities to three significant figures.
c. Unit Cost to three significant figures.

ABBREVIATED COST MODEL (ACM)

The purpose of this sheet is to:

A. Identify Entire Facility

List total CWE cost, quantity and unit. Develop a cost/unit relationship using the most reflective quantity and unit for the entire facility.

B. Classify All Cost Into Six Major Functions

The cost associated with each function shall be the total CWE cost of that item. All markups in the estimate shall be included when developing the function's associated cost.

C. Develop Unit Cost for Functions

Divide the functions cost by the quantity (using quantity and unit used for the entire facility). State each unit cost for each function.

Rounding:

a. Cost shall be to nearest hundred.
b. Unit Cost to three significant figures.

GRAPHICAL FUNCTION ANALYSIS (GFA)

The purpose of this sheet is to:

A. List Subfunctions

For each of the three highest cost functions a separate Graphic Function Analysis will be provided. List the Subfunction for the particular function.

B. Bar Chart Each Subfunction

Chart each Subfunction to a common scale (Common for that Functional category). The length of the bar is based on the cost of the Subfunction relative to the Scale.

SAMPLE VE FORM

VALUE ENGINEERING ALERT FORM (VEAF)

SAMPLE VE FORM

ABBREVIATED COST MODEL (ACM)

GRAPHIC FUNCTIONAL ANALYSIS (GFA)

APPENDIX A

TRI-SERVICE MILITARY CONSTRUCTION PROGRAM (MCP) INDEX

TRI-SERVICE MILITARY CONSTRUCTION PROGRAM (MCP) INDEX

This sheet provides the index numbers for use in escalating to midpoint of construction. The MCP Index is adjusted reflecting revised and projected economic conditions. The A-E shall check with the Corps of Engineers' project manager to obtain the latest MCP Index. The example below shows how the index numbers corresponding to the Midpoint of Construction date and the Estimate Base date are used to compute escalation. (See bottom of Cost Distribution Sheet SPK Form 50.)

EXAMPLE

	DATE	INDEX NUMBER
MIDPOINT OF CONSTRUCTION	OCT 86	1492
ESTIMATE BASE	JAN 85	1410

$$\text{ESCALATION FACTOR} = \frac{\text{MIDPOINT INDEX}}{\text{BASE INDEX}} = \frac{1492}{1410} = 1.058$$

PERCENT ESCALATION = (ESCALATION FACTOR - 1) X 100 = 5.8 %

APPENDIX B

MANUAL CODE A SAMPLE ESTIMATE

C COMPUTER CODE B AND C SAMPLE INPUT.....#

APPENDIX C

COMPUTER CODE B AND C SAMPLE INPUT

```
$*$U6 DOMTMR
$*$RCD
$      SNUMB   SPK01
$      IDENT   2108SOASPK,PROJECT,AETEST
$      USERID  2108SOASPK$SXANMT
$      PARAM   GEN01,ESSPK7UPB87A
$      SELECT  2108HUD170/CACES/XQT/76120.AX
$      DATA    CR
PJ A-E SAMPLE                      U.S. ARMY                    C
AE COST ESTIMATING             SPKED               7/12/88
Y
N1           CONSTRUCTION COST ESTIMATE FOR THE COMMUNICATION, EQUIPMENT
N2 SPECIFICATION NO. 7576
N3 ESSPK7UPB84A  GEN01
N4  BOB LUCKEY         - ARCH/STRUCT
N5  ART DEIL           - CIVIL
N6  LOUIS CHAN         - MECH
N7  BILL JONES         - ELECT
CRLASBW 28.81
CRLBOIM 29.20
CRLCAMI 23.43
CRLCARP 22.77
CRLCMAS 19.26
CRLELEC 23.01
CRLGLZR 21.46
CRLIWRE 26.59
CRLIWSS 27.11
CRLIWWE 26.59
CRLLABR 19.65
CRLLATH 18.14
CRLMABL 21.49
CRLMAHE 15.37
CRLMAMA 20.62
CRLMAST 18.51
CRLOEHO 26.24
CRLOELE 22.94
CRLOEME 24.49
CRLOEOL 20.42
CRLPLAS 21.11
CRLPLHE 17.59
CRLPLUM 26.52
CRLPTRO 20.49
CRLRFCO 20.18
CRLRFHE 14.56
CRLSELC 24.69
CRLSHMT 29.76
CRLSKCR 21.46
CRLSPFI 28.40
CRLSPIN 27.87
CRLTDHY 22.74
CRLTDLT 20.46
CRLTIFL 19.74
CRLTIHE 19.95
PMU                        1P         10P        10P
SCSW 01 SITE WORK                8 P        7.5 P
SCPC 01 PRECAST CONCRETE         8 P          5 P
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SCMA 01 MASONRY                   7 P          5 P
SCSS 01 STRUCTURAL STEEL          8 P          7 P
SCCW 01 CABINET                   7 P          5 P
SCMR 01 MEMBRANE ROOFING          8 P          5 P
SCPR 01 PREFORM ROOFING           8 P          5 P
SCGL 01 GLASS GLAZING             7 P          5 P
SCLP 01 LATH PLASTER              8 P          5 P
SCGW 01 GYP BOARD                 7 P          5 P
SCTI 01 TILE                      7 P          5 P
SCAT 01 ACOUSTICAL                7 P          5 P
SCRH 01 RESILIENT FLG             8 P          5 P
SCCA 01 CARPETING                 7 P          5 P
SCSF 01 SPEC FLOORING             6 P          5 P
SCPS 01 PAINTING SEALANT          8 P          5 P
SCWC 01 WALL COVERING             7 P          5 P
SCEV 01 ELEVATORS                 8 P          6 P
SCHV 01 HVAC                      8 P          8 P
SCSM 01 SHEET METAL               8 P          8 P
SCIN 01 INSULATION                8 P          5 P
SCFP 01 FIRE PROTECTION           7 P          5 P
SCPL 01 PLUMBING                  8 P          7 P
SCEL 01 ELECTRICAL                8 P          6 P
SCES 01 SPECIAL ELEC              8 P          8 P
BI001 BID ITEM 1 - BUILDING
FC    BUILDING DEMO AND SUBGRADE                                  1SF    27650
401021126006 WEAKENED PL. JT.  LF    938
401022211911 FOOTING XC        CY     44
401022223101 SQUARE FTNG. XC   CY    113
FC    CONCRETE                                                    1SF    27650
401031101112 CONT. FTNG. FORM  SF   1940
402036103002 GROUT COL. BASE   SF     84
FC    MASONRY                                                     1SF    27650
404041101101 8" BB& LINTELS  MALF    155
404041101401 3X7 GROUTED DOORMAOPN     7                  6.00
404041101401 OPENINGS                   R
304041501000 WALL VENTS          MAEA      8 AMABF   1   33.75
FC    METALS                                                      1SF    27650
402051201001 STRUCTURAL STEELSSTON   105
307051202400 TRENCH EDGE ANGLES  SSLF   1336 SIWSB 195   12.15
307055305000 TRENCH COVERS       SSSF   1346 SIWSC 220   12.75
307055305000 3/8" DIAMOND PLATE             R
FC    WOOD AND PLASTICS                                           1SF    27650
404061202002 1/2" PLYWOOD      SF   1455                  .45
404061202002 FIRE RETARDANT             R
406064104005 LP COUNTERTOPS  CWLF     36
FC    THERMAL & MOISTURE PROTECT                                  1SF    27650
401071115003 PLASTIC V.B.    PSCSF   171
401071601001 BITUM W.P.      PSCSF     4                15.00
404079201108 POLYURETHANE    PSCLF    11                23.00
FC    DOORS AND WINDOWS                                           1SF    27650
405081101004 3X7 STL DR FRAME  EA     17                52.00
405081101006 6X7 STL DR FRAME  EA      6                59.00
305083302000 TEMPEST DOOR PR       EA      2 SIWSB .75 2650.00
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FC    FINISHES                                                1SF    27650
304091000001 EXT IN & FIN FASCIA LPSF   6629 ALATA 650    2.15
304091000002 EXT IN & FIN INFILL LPSF   1280 ALATA 725    1.25
406099201371 PAINT DOOR&FRAMEPSEA     41
FC    SPECIALTIES                                             1SF    27650
407105012004 LOCKER BENCHES    LF      5
307105021100 9X12 BOX LOCKER       EA     10 MSHMA  50   74.00
407108101014 TOILET PAPER DIS  EA      5                  26.50
FC    EQUIPMENT                                               1SF    27650
413118754005 DOCK LEVELERS     EA      2
308115501000 VACUUM SYSTEM       PLLS      1 ULABD .25 2605.00
FC    FURNISHINGS                                             1SF    27650
307121001001VINYL MINI BLINDS      SF   4552 ACARA 500     4.5
307121001002ALUMINUM FLOOR MAT     SF    100 ACARA 150      12
FC    SPECIAL CONSTRUCTION                                    1SF    27650
413143021003 HOIST             EA      1
FC    PLUMBING                                                1SF    91620
408154501121 WAT.CLOS.WALL HGPLEA     23
408154501313 URINAL WALL HNG PLEA      6
408154501521 LAV.COUNTER TOP PLEA     28
FC    FIRE PROTECTION                                         1SF    91620
410155101212 WET SPRINKLER HDFPEA    782
410155101212 AREA 65160 SF             R
410155301102 STAND PIPE & PM FPEA      1
310155081020 HALON FIRE PROTECT  FPLS      1 N/A        391875
310155081020 AREA = 412500 CF               R
FC    HVAC                                                    1SF    91620
409158341109 AHU 2,3&5-21    HVEA     19
409158341109 13200 CFM                 R
309156721005 RECIP AIR COOLED    HVEA      2 MSPFN .30   66000
309156721005 CHILLER 150 TON                R
FC    ELECTRICAL                                              1SF    91620
411163302601 30KVA DRY TRANS.ELEA      1
311161101075 6X6 CROSS           ESEA      5 EELEB   6      23
411161141103 18" CABLE TRAY  ESLF    504
BI002 BID ITEM 2 - CIVIL SITE & UTILS
FC CLEARING AND DEMOLITION                                    1LS        1
414021126001 SAW BIT PAVE      LF  43691
414021126001                           P 200
314021127000 UTILITIES             LF    225 CODEK 260
314021127000 REM. 3 IN WATER                R
314021127000 LINE                           R
FC EARTHWORK                                                  1CY     2800
414022261004 EXCAVATION      SWCY   2800
414022101004 ROUGH GRADING     CY   8450
414026111001 COMP SUBGR  SM    SY  16063
414026111001                          P1000
FC UTILITY, SEWER                                             1LF      160
316025911002 CONN. TO EXISTING   PLEA      1 MPLUS   1      30
316025911002 MANHOLE                        R
416024631002 6-IN SEWER LINE PLLF    160
FC UTILITY, DRAINAGE                                          1LF      265
316025911002 CONN. TO EXISTING   PLEA      1 MPLUS   1      30
316025911002 MANHOLE                        R
316024642210 4 IN PERF. PIPE     PLLF    265 MPLUS 265    3.10
FC UTILITY, GAS                                               1LF      100
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316025911003 CONN. TO EXISTING   PLEA      1 MPLUS   2      10
316025911003 2 IN GAS PIPE                  R
416025512001 1 IN GAS LINE   PLLF    100                 4.10
416025512001                             P 300
FC UTILITY, WATER                                        1LF      250
416151092102 6 IN FIRE HYD.  PLEA      2               480.00
416151092102                             P 3.5
416024642202 6 IN PVC CL. 150PLLF      2                 7.37
316151011412 8 IN X 6 IN TAPING  PLEA      3 MPLUJ   2     800
FC PAVING, BITUMINOUS                                    1SY      200
415026121401 BIT SURF COURSE SWTON  1180                27.00
415026121401                             P 400
315026112002 SUBBASE COURSE      SWTON  3438 COFCL1000    5.00
415022102002 FINE GRADE      SWSY    200
FC PAVING, CURBS AND GUTTERS                             1CY        1
415026201101 CURB CONCRETE     LF   2435                 3.43
415026201101                             P  95
415026201101 CAST IN PLACE               R
FC PAVING, SIDEWALKS AND PADS                            1SY      295
415026303101 CONC WALK 4 IN    SF   7944                  .92
415026303101                             P 660
415033201003 TOPPING SALT FIN  SF   7200
FC SITE IMPROVEMENTS & SPECIALTIES                       1LS        1
415034145101 BUMPER CURB       EA    112
415027221111 STREET SIGNS      EA      9
315026182005 EXTERIOR SIGN         EA      1 ULABA   1    1500
FC FENCES AND GATES                                      1LF       75
315027114058 10FT X 9 FT DOUBLE  SWEA      1 ULABL   4     190
315027114058 GATE                           R
314027113106 CHAIN LINK FENCE    SWLF     75 ULABL 350    4.50
415027111101 POST HOLE       SWEA     25
FC IRRIGATION AND LANDSCAPING                            1SF      300
415028203002 6IN TOPSOIL     SWCY    150
315028302006 FERTIL.AND SOIL AMENSWSF    300 ULABA2229     .15
315028307020 COYOTE BUSH 1 GAL   SWEA     20 ULABF1750    4.15
FC ELECTRICAL DISTRIBUTION                               1LF     1000
311163304118 500KVA PADMOUNT TRANELEA      1 EELEB  .4   28800
416161203101 #1 15KV CU CABLEELMLF     1
416164511104 #6 BARE CU WIRE ELMLF     1
FC OUTSIDE LIGHTING                                      1LS        1
416165702114 LIGHT POLE      ELEA      4
416161201202 #10 THW WIRE    ELMLF   2.5
314022102001 COMPACT FOR SUBBASE   SY   5300 COFCD1500
FC COMMUNICATION                                         1LF       65
416033111171 DUCT ENCASE CONCELCY     65
416164113003 COMM. MANHOLE   ELEA      1
$      SELECT  2108HUD170/CACES/XQT/76125.AX
$      DATA    CR
EST       ORG  NN NN NNNNN NN NN   SACRAMENTO DISTRICT, CALIFORNIA
$      ENDJOB
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